

National Vocational and Technical Training Commission (NAVTTTC)

Competency Standards for Energy Efficiency Adviser



giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



Table of Contents

Sr. No:	Content	Page No:
1.	A: Acquire Project	3
2.	B: Conduct Energy Review of the Company	5
3.	C: Advise on developing company energy policy and strategies	9
4.	D: Monitor the energy performance of Company	13
5.	E: Develop Workforce Competencies of the Company	15
6.	F : Develop Professionalism	17
10.	List of Tools, Equipment & Machinery	19

Title A: Acquire Project

Overview: This Competency Standard identifies the competencies required to acquiring a project by Energy Efficiency Adviser in accordance with the organization's approved guidelines and procedures. You will be expected to prepare a project proposal and finalize the contract. Your underpinning knowledge regarding acquiring a project will be sufficient enough to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
A1. Prepare a Project Proposal	<p><i>You will be able to:</i></p> <p>P1. Interpret the requirements of the project as per terms of reference (TORs)</p> <p>P2. Conduct a market research limited to project scope for:</p> <ul style="list-style-type: none"> • Assessing competitors (strengths and weaknesses) • Assessing your organizational capabilities <p>P3. Estimate the resources as per project requirement</p> <ul style="list-style-type: none"> • Human resources • Man Hours • tools and equipment • logistics • material consumables • Project time <p>P4. Estimate project cost as per resources</p> <p>P5. Write the project proposal as per Terms of Reference (TORs)</p> <p>P6. Validate the project proposal as per Terms of</p>	<p><i>You will be able to:</i></p> <p>K1. Explain basic business terminologies</p> <p>K2. Read and Interpret the project requirement</p> <p>K3. Enlist commonly used sources of information</p> <p>K4. Explain the basic market research methodologies</p> <p>K5. Describe the project resources, time and cost estimation techniques</p> <p>K6. Explain the contents of project proposal</p>	ICT including Computer system, office software, internet facility, printer, stationary items,

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	Reference (TORs)		
A2. Finalize the contract	<p><i>You will be able to:</i></p> <p>P1. Review the roles and responsibilities of parties in the contract as per project requirement</p> <p>P2. Coordinate with relevant departments to review legal, OHS, environmental and other requirements, applicable to the project</p> <p>P3. Negotiate the terms and conditions of the contract as per project requirement</p> <p>P4. Compile the contract document as per legal and other requirements</p>	<p><i>You will be able to:</i></p> <p>K1. Describe types of contracts</p> <p>K2. Explain the Contract formulation</p> <p>K3. Explain basic legal, OHS, environmental and other requirements related to contractual assignments</p>	ICT including Computer system, office software, internet facility, printer, stationary items,

Title B: Conduct Energy Review of the Company

Overview: This Competency Standard identifies the competencies required to conduct energy review of the company by energy efficiency adviser, in accordance with the organization's approved guidelines and procedures. You will be expected to collect available data and information, measure the required data, analyze energy use and consumption of the company, develop EnPIs and their baseline and identify areas of improvement potential for the company. Your underpinning knowledge regarding conducting energy review of the company will be sufficient enough to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
B1. Collect available data and information of company	<p><i>You will be able to:</i></p> <p>P1. Determine the data requirement to initiate energy review, after understanding process flow</p> <p>P2. Identify data sources for data collection, as per available resources</p> <p>P3. Communicate data requirement in understandable way to relevant department</p> <p>P4. Collect the required data from identified sources</p>	<p><i>You will be able to:</i></p> <p>K1. Explain methods of process analysis</p> <p>K2. Describe forms of energy, fuel types, prices and tariffs</p> <p>K3. Describe Energy Parameters (e.g: calorific value of fuel, heat content, power frequency etc)</p> <p>K4. Explain the conversion of energy units</p> <p>K5. Describe data collection techniques</p>	ICT including Computer system, office software, internet facility, printer, stationary items, Personal protective equipment (PPE)
B2. Measure the required data of company	<p><i>You will be able to:</i></p> <p>P1. Determine the data measurement requirement for energy review</p>	<p><i>You will be able to:</i></p> <p>K1. Explain data gap analysis</p>	Computer system, Energy analysers, Energy data loggers, Emission analyser, Thermal imager, IR temperature gun, Water

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	<p>P2. Identify measurement points for required data</p> <p>P3. Identify OHS requirements for data measurement</p> <p>P4. Select measurement equipment as per requirement (accuracy, reliability, complexity, time, cost)</p> <p>P5. Take required measurement using selected equipment (if necessary), with safety precautions</p> <p>P6. Guide energy team to take measurement using selected equipment</p> <p>P7. Perform measurement system analysis as per MSA methodology</p> <p>P8. Compile the measured data for further analysis</p>	<p>K2. Explain major energy flows in an industry</p> <p>K3. Describe the energy parameters for measurement</p> <p>K4. Enlist OHS requirements for using measurement equipment</p> <p>K5. Explain working principles and usage of different measuring equipment</p> <p>K6. Describe Measurement System Analysis (MSA)</p>	<p>flow meter, Air flow meter, Gas flow meter, Tachometer, Lux meter, Noise meter, Ultrasonic leakage detector, pH meter, TDS meter, Water Hardness kit, Earth resistance tester, measuring tape, stop watch, hour meter, PPEs</p>
<p>B3. Analyze energy use and consumption of company</p>	<p><i>You will be able to:</i></p> <p>P1. Conduct process flow analysis using collected and measured data</p> <p>P2. Develop energy and mass balance with in project boundaries</p> <p>P3. Identify patterns of energy consumption of organization</p>	<p><i>You will be able to:</i></p> <p>K1. Explain Data analysis techniques</p> <p>K2. Read and Interpret energy distribution network diagrams / drawings</p> <p>K3. Explain procedure of energy and mass</p>	<p>ICT including computer system, internet facility, spread sheet, e-sankey, steam tables, nomographs</p>

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	<p>P4. Identify areas with significant energy consumption of organization</p> <p>P5. Identify inter-relations between energy consumption and operating parameters of systems</p> <p>P6. Calculate the costs of energy flows for significant energy users</p>	<p>balancing</p> <p>K4. Explain the effect of operational parameters on energy consumption</p> <p>K5. Explain energy cost calculations</p>	
<p>B4. Develop EnPIs & their baseline for the company</p>	<p><i>You will be able to:</i></p> <p>P1. Establish energy performance indicators (EnPIs) for significant energy users</p> <p>P2. Develop baseline for established EnPIs</p>	<p><i>You will be able to:</i></p> <p>K1. Explain Performance Indicators</p> <p>K2. Explain criteria to identify organization's appropriate EnPIs</p> <p>K3. Explain variables effecting energy performance</p> <p>K4. Explain establishment of baseline considering controllable and uncontrollable variables</p>	<p>ICT including computer system, internet facility, spread sheet</p>
<p>B5. Identify areas of improvement potential of the company</p>	<p><i>You will be able to:</i></p> <p>P1. Calculate the efficiency of significant energy users, with in project scope</p> <p>P2. Identify internal and external energy performance benchmarks</p> <p>P3. Analyse the gap between baseline and identified benchmarks</p>	<p><i>You will be able to:</i></p> <p>K1. Explain the basic working principles and efficiency parameters of the following:</p> <ul style="list-style-type: none"> A. Generators B. Compressors C. Furnaces D. Boilers and heaters E. HVACR (Heating, ventilation, air 	<p>ICT including computer system, internet facility, spread sheet</p>

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	P4. Set targets for energy performance for significant energy users	<p>conditioning and refrigeration)</p> <p>F. Expanders/ Turbines</p> <p>G. Water treatment system</p> <p>H. Electric motors and drives</p> <p>I. Lighting systems</p> <ul style="list-style-type: none"> • Energy Distribution system <ul style="list-style-type: none"> A. Steam distribution system B. Electrical distribution system C. Air distribution system • Generation Techniques <ul style="list-style-type: none"> A. Open cycle generation B. Co-generation C. Tri-generation D. Combined cycle generation • Introduction to renewable and alternate energy • Heat recovery equipment <ul style="list-style-type: none"> A. Economizer B. Air pre-heaters C. Heat pipes D. Waste heat recovery boiler <p>K2. Explain basic benchmarking techniques</p> <p>K3. Comprehend how to set realistic targets for specific industry</p>	

Title C: Advise on developing company energy policy and strategies

Overview: This Competency Standard identifies the competencies required to advice on developing company energy policy and strategies by energy efficiency adviser, in accordance with your organization’s approved guidelines and procedures. You will be expected to guide company on preparing energy policy and objectives, identify options for improvement of energy performance, prioritize identified energy performance improvement options, develop action plan for selected energy improvement options and review progress of implementation of action plan. Your underpinning knowledge regarding advice on developing company energy policy and strategies will be sufficient enough to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
C1. Guide company on preparing energy policy and objectives	<p><i>You will be able to:</i></p> <p>P1. Develop an outline for energy policy for the company based on international standard (ISO 50001)</p> <p>P2. Develop an outline for energy objectives for the company consistent with energy policy</p> <p>P3. Review the draft of the energy policy prepared by company, according to international standard (ISO 50001)</p> <p>P4. Review the draft of the energy objectives prepared by company, consistent with energy policy</p> <p>P5. Develop a methodology for periodically reviewing and updating energy policy and objectives, based on energy performance</p>	<p><i>You will be able to:</i></p> <p>K1. Explain the structure and contents of an energy management system according to ISO 50001</p> <p>K2. Explain basic concepts of formulation of a policy and objectives.</p> <p>K3. Explain ways of adaptation and formulation of an energy policy and objectives for a specific company.</p> <p>K4. Comprehend concepts of giving constructive feedback (e.g: sandwich methodology, distinguish between person and work)</p>	ICT system , ISO 50001 (standard)

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
C2. Identify options for improvement of energy performance	<p><i>You will be able to:</i></p> <p>P1. Determine options for improvement of energy performance.</p> <p>P2. Calculate energy performance improvement potential for each identified option (e.g: energy saving)</p>	<p><i>You will be able to:</i></p> <p>K1. Explain existing options and measures for improvement of energy performance in industries</p> <p>K2. Explain different energy efficiency labels and their signification(e.g. energy star label)</p> <p>K3. Explain source of information and methods to retrieve information on energy performance improvement options.</p> <p>K4. Explain suitability of an energy efficiency measure for a specific process</p> <p>K5. Explain how to calculate energy efficiency improvement potential</p>	ICT System, Equipment manuals
C3. Prioritize identified energy performance improvement options	<p><i>You will be able to:</i></p> <p>P1. Define criteria for prioritization of identified energy performance improvement options</p> <p>P2. Calculate required resources (e.g. HR, time, financial) for the identified energy performance improvement options</p> <p>P3. Make a comparison of identified energy performance improvement options based on</p>	<p><i>You will be able to:</i></p> <p>K1. Explain sources of data required for energy saving calculations</p> <p>K2. Explain Financial Analysis Techniques as below</p> <ul style="list-style-type: none"> • Capital expenditures (CAPEX) • Operational expenditures (OPEX) • Life Cycle Analysis 	ICT system, Project planning software (e.g. MS project)

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	<p>defined criteria</p> <p>P4. Present priority list of energy performance improvement options to management of the company</p>	<ul style="list-style-type: none"> • Payback period • IRR • NPV <p>K3. Explain other factors that determine implementation, like time, complexity, required expertise</p> <p>K4. Explain prioritizing techniques (e.g. Gravity Urgency and Tendency (GUT), Complexity-Investment-Savings, according to payback, cost-benefit-analysis)</p> <p>K5. Explain presentation and visualization techniques</p>	
<p>C4. Develop action plan for selected energy improvement options</p>	<p><i>You will be able to:</i></p> <p>P1. Define required resources (e.g. time, HR, financial) for implementation of selected energy improvement options</p> <p>P2. Acquire required resources from company management</p> <p>P3. Prepare action plan for implementation of selected energy improvement options</p> <p>P4. Present action plan to management for</p>	<p><i>You will be able to:</i></p> <p>K1. Explain basic project planning methodology</p> <p>K2. Explain negotiation techniques to acquire resources from company management</p> <p>K3. Explain presentation and visualization techniques</p>	<p>ICT system, Project planning software</p>

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	perusal and support staff for implementation		
C5. Review progress of implementation of action plan	<p><i>You will be able to:</i></p> <p>P1. Analyze project progress (milestones) in set timelines</p> <p>P2. Verify the implementation procedure, in accordance with action plan</p> <p>P3. Suggest adaptations in action plan if actual progress is not as per plan</p> <p>P4. Prepare project progress report of the implementation of action plan</p>	<p><i>You will be able to:</i></p> <p>K1. Explain monitoring and evaluation techniques of a project</p> <p>K2. Explain ways to deal with obstacles and crises during implementation</p>	ICT system, Project planning software

Title D: Monitor the energy performance of Company

Overview: This Competency Standard identifies the competencies required to monitor the energy performance of the company by energy efficiency adviser, in accordance with the organization's approved guidelines and procedures. You will be expected to develop a measurement plan for monitoring the energy performance, compare actual Vs Target energy performance and review Effectiveness of Action Plan. Your underpinning knowledge regarding monitoring the energy performance of Company will be sufficient enough to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
D1. Develop a measurement plan for monitoring the energy performance	<p><i>You will be able to:</i></p> <p>P1. Determine data requirements for periodic monitoring of energy performance indicators, for Significant Energy Users</p> <p>P2. Identify locations for data collection as per data requirements</p> <p>P3. Identify measurement equipment with specifications as per data requirements and identified locations</p> <p>P4. Devise selection criteria for measurement equipment (OHS, Reliability, Calibration, Accuracy, Frequency, Cost, Time)</p> <p>P5. Devise timelines and responsibilities for execution of measurement plan based on review requirements</p>	<p><i>You will be able to:</i></p> <p>K1. Explain Performance Indicators</p> <p>K2. Explain criteria to identify organization's appropriate EnPIs</p> <p>K3. Explain variables affecting energy performance</p> <p>K4. Explain working principles and usage of different measurement equipment</p> <p>K5. Enlist OHS requirements for using measurement equipment</p>	ICT including Computer system, office software, internet facility, printer, stationary items

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
		K6. Explain the contents of Measurement Plan	
D2. Compare actual Vs Target energy performance	<p><i>You will be able to:</i></p> <p>P1. Perform measurement system analysis as per MSA methodology</p> <p>P2. Compile the measured data for further analysis</p> <p>P3. Analyze gap between actual vs baseline and target energy performance</p> <p>P4. Identify patterns of energy performance of significant energy users</p> <p>P5. Document energy performance based on gap analysis</p>	<p><i>You will be able to:</i></p> <p>K1. Describe Measurement System Analysis (MSA)</p> <p>K2. Explain statistical analysis techniques</p> <p>K3. Describe key contents of effective report writing</p>	Computer system, office software, internet facility, printer, stationary items
D3. Review Effectiveness of Action Plan	<p><i>You will be able to:</i></p> <p>P1. Calculate energy savings of implemented actions as per action plan</p> <p>P2. Analyze gap between proposed and actual energy saving of implemented actions</p> <p>P3. Assess impact of realized saving on Energy Performance Indicators</p> <p>P4. Recommend corrective and preventive measures to mitigate gaps identified in gap</p>	<p><i>You will be able to:</i></p> <p>K1. Explain root cause analysis techniques</p>	Computer system, office software, internet facility, printer, stationary items

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	analysis		

Title E: Develop Workforce Competencies of the Company

Overview: This Competency Standard identifies the competencies required to develop workforce competencies of the company by energy efficiency adviser, in accordance with the organization’s approved guidelines and procedures. You will be expected to design training based on need assessment, execute the training plan and evaluate the effectiveness of training. Your underpinning knowledge regarding development of workforce competencies of Company will be sufficient enough to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
E1. Design Training Based on Need Assessment	<p><i>You will be able to:</i></p> <p>P1. Determine training needs to promote energy efficient operations of the organization for each level</p> <p>P2. Develop the training plan (objectives, topics, resources, target audience and schedule), based on training needs:</p> <p>P3. Communicate the training plan within the organization according to organizational guidelines</p>	<p><i>You will be able to:</i></p> <p>K1. Explain the training need assessment methodology</p> <p>K2. Describe the best practices for designing the effective training.</p> <p>K3. Identify factors required to communicate effectively and precisely within organization.</p>	ICT including Computer system, office software, internet facility, printer, stationary items
E2. Execute the Training Plan	<p><i>You will be able to:</i></p> <p>P1. Review progress of implementation of trainings against designed plan</p>	<p><i>You will be able to:</i></p> <p>K1. Explain monitoring and evaluation techniques</p>	ICT including Computer system, office software, internet facility, printer, stationary items

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	<p>P2. Identify barriers in execution according to training plan</p> <p>P3. Modify training plan to tackle the identified barriers</p>	<p>K2. Explain ways to deal with obstacles and crises during implementation</p>	
<p>E3. Evaluate the Effectiveness of Training</p>	<p><i>You will be able to:</i></p> <p>P1. Design criteria for evaluation of trainings as per training need assessment (TNA)</p> <p>P2. Perform evaluation of conducted training as per training need assessment (TNA)</p> <p>P3. Analyze effectiveness of trainings based on results of evaluation</p> <p>P4. Recommend improvements in training plan based on effectiveness analysis</p>	<p><i>You will be able to:</i></p> <p>K1. Explain training evaluation techniques</p>	<p>ICT including Computer system, office software, internet facility, printer, stationary items</p>

Title F: Develop Professionalism

Overview: This Competency Standard identifies the competencies required to develop professionalism by energy efficiency adviser, in accordance with the organization’s approved guidelines and procedures. You will be expected to perform communication at each level and upgrade professional skill set. Your underpinning knowledge regarding developing professionalism will be sufficient enough to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
F1. Perform communication at each level	<p><i>You will be able to:</i></p> <p>P1. Communicate within organization according to organizational guidelines</p> <ul style="list-style-type: none"> • Management • Energy team • Employees <p>P2. Communicate with business partners according to organizational guidelines</p> <p>P3. Communicate with relevant authorities according to organizational guidelines</p> <p>P4. Prepare reports appropriate for the audience</p>	<p><i>You will be able to:</i></p> <p>K1. Explain how to communicate at different levels</p> <p>K2. Explain how to write reports for specific purpose and audience</p> <p>K3. Explain how to present specific information for a specific audience.</p> <p>K4. Explain how to negotiate effectively with relevant stakeholders.</p>	ICT system

Unit of Competency	Performance Criteria	Knowledge	Tools & Equipment
	P5. Present information to different audience P6. Negotiate with management and business partners		
F2. Upgrade professional skill set	<i>You will be able to:</i> P1. Improve professional skills in current career path on continuous basis P2. Seek learning opportunities in new relevant areas to diversify skill set. P3. Adapt to changing business environment	<i>You will be able to:</i> K1. Explain sources for professional development: <ul style="list-style-type: none"> • Professional bodies • Prevailing standards • Certification courses • Online libraries • Webinars • Technical journals • Conferences or other events 	ICT system

List of Tools, Equipment and Machinery

- Computer system
- Measuring tape
- Stop watch
- Energy analysers
- Energy data loggers
- Emission analyser
- Thermal imager
- IR temperature gun
- Water flow meter
- Air flow meter
- Gas flow meter
- Tachometer
- Lux meter
- Noise meter

- Ultrasonic leakage detector
- pH meter
- TDS meter
- Water Hardness kit
- Earth resistance tester

SOFTWARE

- E-sankey software
- MS Project/ Primavera/ Openproj
- 3E plus
- MS Office
- ISO 50001